Teachers' Opinion on the Implementability of Interactive Books in the Classroom

The Experience of an Extensive Hungarian Research

Gabriella Daróczi and Emőke Varga

Abstract *The authors were invited to investigate the possibilities of implementing interactive books in the classroom in 2019–2020. 34 public education institutions, 100 teachers and 2219 pupils participated in the research. The interactive book on smart devices, which is the primary research material of the chapter and which offers a revolutionary opportunity to sustain the literary interest of the young population, to develop their digital literacy culture and habits and their reading comprehension skills, was (also) studied from the point of view of the mediating teachers' opinion formation. Firstly, we assumed that teachers in Hungarian public schools (teachers of 8–12-year-olds and teachers of Hungarian language and literature) have little or no knowledge of interactive book applications and are reluctant to implement multimedia tools in the classroom without goal-oriented information and good practice. Secondly, we assume that interactive books foster: (1) word-level knowledge, (2) syllable-based reading at word-, sentence – and text level that lay the foundations for reading comprehension, and (3) facilitate and stabilize meaning identification primarily through animations and interactions, which all result in better performance in understanding time-space relationships. In this chapter, we would like to present the results of our investigation, which confirmed our practice of operating primarily (or exclusively positive transfer effect of the digital tool on the text comprehension skills of children.*

Keywords *Interactive Book; Implementation; Positive Transfer; Teacher Attitude; Children's Reading Comprehension Skill*

The Extensive Research Behind the Study

It can be argued that the transition from the Gutenberg to the Neumann galaxy is forcing a change of approach in institutional education and training, regardless of national curricula, anywhere in the world. The digitalization of the environment for skills development, knowledge transfer and transmission of tradition has led to the expectation that research and theory writing should demonstrate to teachers, in the form of applicable knowledge, the positive transfer effects of technomedia on children's skills. The latter is also the authors' basic hypothesis. In the following, the measurement experiences and methodological implications of the use of a technomedia, in the form of the interactive storybook, in the classroom, which has a positive impact on teachers' attitudes and students' comprehension skills, are presented.

The authors were invited by the Hungarian government's national digital development programme to investigate the possibilities of implementing interactive books (as a type of application that can be run on smart devices) in the classroom. The research, conducted from 2019–2021 in 34 public educational institutions with 42 teachers and 2.219 students, was based on the analysis of 17.2614 software-collected data sets on the use of 4.303 downloaded books. The interactive books used in the measurements were developed by an award-winning European edtech company, BOOKR Kids Ltd.

The aim of the research was twofold: on the one hand, in the framework of the project prior to the data collection, to familiarise the target audience (children aged 7–12) and the prospective mediators (teachers) with the interactive book in a professionally structured way. The other goal was that the target audience of the survey incorporate with success in their own teaching and learning practices the new possibilities, which are considered revolutionary in the development of digital literacy and reading comprehension. The aim was therefore to prepare, observe and prove – through webinars, consultations and training sessions – that BOOKR Suli's discreetly animated interactive books (a) develop students' language awareness in a variety of ways, (b) have a positive transfer effect on students' reading comprehension performance, (c) interactive books can be implemented in the course of the first language and literature, and (d) during a professional – methodological project related to the research, teachers will be convicted of the benefits of the implementation.

In the research practice, in enumerative terms (a-d), this meant data and evaluation of the developments that show the generative impact of the professional-methodological project and can be represented by figures; data and

evaluation of the results induced by the development of the changes in the pedagogical-methodological approach of the subjects of the measurement as a result of the implementation of interactive books.

The data collection phase of the survey, which was carried out with the participation of 42 teachers and 2.219 students, was divided into three periods: PRE, INTRA and POST. During these periods, data were collected through 13 online questionnaires with an average of 30 questions each, and through the so-called teacher administration interface of the BOOKR Suli software. In parallel with the development of the methods and criteria and the creation of the question bank, the project also involved the creation of sample lesson plans for the institutional use of interactive books; the development of a trial application to facilitate the smooth use of the tools by students; and the extension of the research data collection mechanisms of the teacher administration interface. The development of a new versions of the interactive books selected for measurement was necessary in order to make the user processes of each book as comparable and data-rich as possible. In this phase, the authors of this study instructed the developers on communication, aesthetic and pedagogical considerations, among others. Based on the expert and developer guidance of the authors of this study, the multimedia components of the fiction (teaching) material and the question sets for the books have been restructured and expanded.

The research was carried out using quantitative and partly qualitative methods (see online and paper questionnaires), as well as the examination of statistical sources and document analysis. Its novelty – from a theoretical point of view – was, on the one hand, the presentation of hitherto unpublished and unanalysed aspects related to the question of the educational usability of interactive books. On the other hand, the novelty was, the mapping work that identified the conditions for the use of interactive books in the literature class. From a practical point of view, the significance of the professional-methodological project are as follows: firstly, recording and evaluating data showing the generative impact of the developments, which can be illustrated by figures; secondly, recording and evaluating the results induced by the development of the BOOKR books included in the research; finally recording and evaluating the changes in the teachers' pedagogical-methodological approach – subjects of the measurement – as a result of the introduction of interactive books. The paper presents in detail the results of the research on teachers' reflections (indicated by point d above).

The International Contexts of the Interactive Book Research

Researchers (Bényei et al. 72–78; Boldog et al. 56–77; Contini et al.) have been examining issues related to the use of digital technologies in the classroom for over 15 years. How do teachers use IT tools, what software do they prefer, what socio-economic-infrastructural factors can and should be examined in relation to the use of technology, in terms of what socio-economic, infrastructural factors can the use of digital technology be examined and is it worth examining and what skills do multimedia tools develop. During the "digital revolution" and due to the paradigm shift brought by the increasing role of digital education around the world (2020–2021), it seems increasingly justified to put these questions in a new perspective and seek new answers to them (Kevin et al. 135–147; Undheim 472–489, Ozbay and Ugurelli 68–75). Among other things, it seems justified to give a more detailed examination of the educational potentials of interactive book as an extension of the institutional use of picture books.

Since the beginning of 2010, researchers, teachers and educators at various universities and international projects around the world have been conducting representative or empirical case study research on the pedagogical effectiveness of interactive books as software suitable for digital transmission of works of (children's) literature in educational settings. In recent years, international and Hungarian projects have focused not only on studying the use of the apps at home and in the nursery school that develop reading comprehension skills of children from age 2 to 6, but also conducting surveys on the use of apps in the classroom (Jayemanne and Nansen; Smeets and Bus 899–920; Estefani and Queiroz 115–127; Takacs et al. 698–739; Takacs and Bus 1–12; Guernsey and Levine 38–43; Eng et al. 285–297; Marsh et al. 1–21; Serafini et al 16–24). The international context of interactive book research cannot, of course, be reduced to pedagogical aspects. Although the focus of our study is on classroom implementation and teachers' reflections on interactive books, we should also mention a territorial dilemma at the outset. To articulate this as a question, we can formulate it as follows: who are the critics competent in exploring the complex semiotical, multidisciplinary, medial, communicational, pedagogical, sociological, reception-psychological, aesthetical, technological, cultural, features of the interactive book? Sargeant (454–466) stresses the need for transdisciplinarity, while Schwebs lists new disciplinary fields alongside literary studies: game studies, ludology, media theory, hypertext theory, narratology.[40] Koenitz calls for the concentration of human resources and the integration of different

disciplines, since research on a complex phenomenon such as interactive digital narratives (IDN) is not feasible without the harmonisation of disciplinary perspectives and conceptual systems, the creation of common databases and the establishment of a university funding framework (Koenitz). The research trend emerging since 2010 on the basis of conferences and publications, as well as institutionalisation forms, seems to be currently strengthening within the field of literary studies, and within this, children's literature and/or narratology. In particular, and most evidently because these applications "create new and versatile possibilities of multimedia combinations […], generally hybrid texts, since they combine features of different narrative forms, such as printed images, animated films and electronic games. Technically, as applications or software, they are capable of exploiting the full range of digital media, representing all their characteristics" (Frederico 121–139).

Among the large-scale investments in research to achieve the above objectives, it is worth mentioning the Brazilian Government's National Education Development Fund program launched in 2013, in which experts selected books that meet the quality criteria for text and image; they were converted into interactive digital texts by the producers, and the products were delivered to schools by the government. It should be emphasized that, as indicated in the publications, expertise focusing on the development of media organizational criteria based on empirical research and the selection of useful types of interaction for students played an important role in this process (Teixeira et al. 292–299). As far as we know, the goal of larger-scale empirical research, similarly to the project of the Brazilian government has been twofold so far. The main focus was primarily on measuring the competencies and user habits of two-to-six-year-old children, who cannot read yet, or on examining the competencies of students aged 6–12 and their teachers that can generally be associated with new technologies. However, at the same time, the contextualisation of the possibilities of implementing interactive books in the educational process and the aspects formulated in the study are also substantially helped by surveys with a smaller number of items and a narrower question horizon, as well as surveys which provide precise figures on the processing of multimedia stories in the classroom (Contini et al.; Bényei and Ruttkay 72–78; Corat and Tal 139–154; Guernsey and Levine 38–43; Estefani and Queiroz; Marzano et al.; Licht and Gonçalves 248–255; Yokota and Teale 577–585). Accordingly, the most frequently recurring and most important questions for our study, which also serve as a basis of comparison, were as follows: under what conditions and to what extent do interactive books develop students' letter recognition

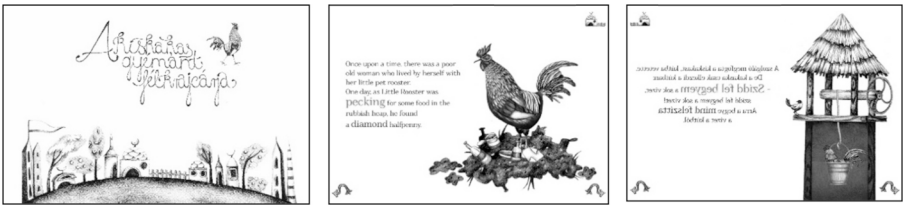
and word-level reading skills, as well as their vocabulary; and to what extent do they contribute to the comprehending of a narrative text. What is the relationship between individual characteristics (age, gender, academic achievement and socio-economic circumstances), the medial mode of story transmission (printed book vs. interactive book) and classroom performance?

Research in Hungary

The first research conducted on interactive books in Hungary was related to the application entitled "The Diamond Half-Crown" of the *Little Rooster*. The app was developed by the interdisciplinary research team of Moholy-Nagy University of Arts for Android and iOS device for 5-8-year-old children learning to read. Its use was tested several times by the developers of the Creative Technology Lab (MOME TechLab) and by the Art for Education Research Group (MűOK) of the University of Szeged.[41] Confirming the empirical research results published in international studies, the measurement results of MOME TechLab and MűOK also demonstrated that "users found, evaluated positively, and interpreted the possibilities of interaction as a *replay* of the narrative in which the image, sound and movement induced by interaction either reinforced the meaning of the text "or filled the meaning potentials left free in the text" (1). Children reacted critically to the difference between the image and the text or the representation of a concept and *their own conceptual image*; the text or their own preconception was not overwritten by the (divergent or complementary) pictorial content (2). The new interactive medium also holds promising opportunities for habituating to letters and teaching reading (3). In interaction design, the relationship between the reader and the characters portrayed, as well as the nature of the reader's existing mental images should be an important consideration over the practice of operating primarily (or exclusively) in IT terms" (Ruttkay et al. 109–117; Ruttkay) (fig. 22).

From 2014–2015, the Art for Education Research group measured user experience through a well-known Aesop's fable, *The Ant and the Grasshopper* picture book variations, and *The Ant and the Grasshopper* applications developed by the internationally known TabTale and Clue Pop. From 2016–2018, the same research team tested the reception processes of 4–6-year-old children using the digital storybooks of the largest Central European developer BOOKR Kids. The research was thematically related to the two most basic tasks of Hungarian education, improving students' reading skills and comprehension skills.

Fig. 22: MOME TechLab. The Diamond Half-Crown of the Little Rooster, excerpt (Varga and Daróczi 21)[42]



In addition to studies published in journals and conference proceedings, the findings of theoretical and empirical research in Hungary have been summarized in the following independent publications: a curriculum that has been used in higher education practice for several years (Gabriella Daróczi et al.), a study collection presenting the interactive books of BOOKR Kids Kft.[43] (Boldog Anna et al.), a theoretical monograph published in Hungarian (Varga), and a volume in Hungarian on survey results of the implementation of interactive books in the classroom (Varga and Daróczi). This paper presents the results related to the use of BOOKR-interactive books in the classroom – and, as indicated above – the teachers' opinions about this in the context of a nationally extended research conducted between September 2019 and January 2020.

Research Theoretical Context

In view of the fact that the definition of an interactive book, which has been available on the international market since 2010 as a new genre capable of digital transmission of fairy tales and other fictional genres, has only been outlined in recent years and that the consensus regarding the definition was only slowly created, it is necessary to make the following points.

An interactive book is a type of application accessible on small versions of computers that are becoming increasingly popular today, on tablets and smartphones. Thus, it is not the same as an e-book because it contains moving images, and you cannot only read it, but you can also listen to it. Thus, the reading by actors, effects, and music play an important role. Due to the segmentation of its motion sequences and the fact that the text is made visible, it is different from an animated film as well although interaction "brings to life" fairy tale heroes on the display and objects can be made to move. However, un-

like in video games, the text plays a decisive role in the interactive book. A tale (and another short prose and lyrical piece of work) is a pre-written, narratively structured linguistic content. In terms of communication, interactive books are a genre related to books meant for silent reading and reading aloud since, at least as far as today's user habits are concerned, they do not substitute but keep their printed "original" versions up-to-date, they do not replace them, but expand and modernize them (Varga 15–16).

Multimedia interactive books, i.e., the ones that use spoken words, readable/visible texts, still images, moving images and non-linguistic spoken modes for meaning making can be a means for students to transfer knowledge to other contexts; not only because of their media richness, but also because of the structure of the application that provides opportunities for interaction. Due to the mutually reinforcing operation of visual, linguistic and auditory channels as well as the opportunity for the learner to make interaction in the intermediate space created between these medial components, better student achievement is observed (Bencsik et al 77–106).

Based on this, the questions we sought to answer in our research were: do teachers agree that in the medially complex space of interactive books, students find it easier to develop their own reading strategies compared to their peers in the control group with printed text? Are they also more effective in constructing one or more possible interpretations, say decoding the multimedia narrative, based on what they read?

Research on Pedagogical Reflections

Research Context, Subjects and Tools

Device use in the public educational institutions involved in the pilot study was measured in the public educational institutions appointed by the Klebelsberg Centre of Ministry of Human Resources.[44] The BOOKR software, delivered to 1.000 students in 34 primary schools has been available to teachers and students since September 2019. However, there were fewer teachers and thus also fewer students that could be involved in the empirical research than indicated above. Not all stakeholders undertook the continuous extra work involved in completing the project. The number of participants in the project may have also been affected by the fact that the consortium leader of the project provided the designated public education institutions with the opportunity to join

the project, but it did not expect the institutions and their teachers to make a commitment. For all these reasons, we had to pay special attention to inspiring and motivating teachers. To achieve this motivation, we helped them in two ways: on the one hand, we presented our research findings about the use of interactive books in the classroom so far; on the other hand, we outlined how they could incorporate interactive books into their individual professional development plan and their expected positive effects on teaching and learning. The following events and organizational forms facilitated motivational activities and created a motivating environment: continuously corresponding with school contacts, teachers and BOOKR Kids developers; continuously operating website presenting the basics of the software and user options; organizing a webinar presenting software basics and user options; presenting the method of integrating the software in the classroom in the framework of consultation and training; presenting useful practices; and visiting schools that were excluded from participating in training but requested personal information.

Out of the 34 institutions selected by the consortium, 16 teachers from 9 schools agreed to participate in all aspects of the research, and teachers from 25 schools partially agreed to participate in the measurement process. The data were thus collected for a total of 2.219 pupils' performance. The total number of teachers involved in all aspects of the impact study on which the research was based was therefore 16. The number of participants in the pilot before the impact study started (those who tried the software but did not measure it) was 14. Data from these three groups are used in the remainder of the study. That is: pilot participants (14), impact study participants (16), total teachers (42 teachers from 34 schools who only partially undertook to collect data). 63% of the teachers participating in the research impact assessment were between 40 and 60 years old, 57% were lower grade teachers at the primary school and 27% were teachers of Hungarian language and literature by qualification. Almost all of them regularly used ICT tools in the classroom; 42% of them had used tablets for several years. According to their own statement, they were happy to try out the BOOKR School software.

Before starting the subjects of the measurement, we worked with the help of the so-called Sample book which helped students to get familiar with the modalities and interactions used in the software. For teachers, lesson plans have been prepared for the following BOOKR-applications: that of the poem *Who ate the Raspberries?* – application with children aged 7–8, the tale *I Tell you a Story about the Green Pig* with children aged 9–10, and thirdly the user adap-

tation of *Family Circle* with students aged 11–12. The criteria used in the lesson plan section below were constant throughout the survey.

Fig. 23: Extract from the lesson plan entitled Who Ate the Raspberries?

1. The introduction stage of the lesson **I.1. Classroom Desk Arrangement** **Arrange the tables in the room so that 4 children can sit at it at the same time.** Ensure that students can move around. **Required equipment:** ▪ **For those using the printed book: textbook, exercise-book, pen holder** ▪ **For those using the interactive book:** tablet	Method used coordination	Tool **classroom equipment:** ▪ course book ▪ exercise book ▪ tablet **(It is advisable to place the worksheets on students' desk at the beginning of the lesson upside down.)**	Form of work and teacher's role coordinator	Development focus
I.2. Group formation				
"Find its match." **We cut a picture into 2-4 parts (according to the size of the group). We cut as many pictures as many groups we want to have. The parts of the pictures having been handed out, everyone tries to find parts of the same shape. Thus, the students who have the parts of a raspberry of the same shape will form a group.** **The topic of the pictures refers to the text to be analysed.** **Question: While you are trying to find your groupmates, observe the parts carefully and guess what picture represents.**		**A large picture (several copies) of a raspberry.**	coordinator	▪ developing visual attention ▪ developing visual logic and content logic skills ▪ recognising formal qualities, developing abstraction skills

Hypotheses

We hypothesized that the BOOKR Class software can be implemented in the classroom by teachers of Hungarian language and literature and meet goals and requirements defined by the *National Core Curriculum* and *Curriculum Framework*, i.e. we hypothesized that (A) sample lesson plans created in accor-

dance with the goals and requirements defined by the *National Core Curriculum* and *Curriculum Framework*[45] in teaching Hungarian language and literature help teachers to incorporate interactive books seamlessly into the classroom; (B) teachers do not have sufficient professional-methodological knowledge to teach literature in a hybrid context. Therefore, they are unable to plan and conduct their interactive book-based lessons to the same quality as print book lessons. We also assumed that they would be convinced of the benefits and advantages of implementing BOOKR Suli, (C) getting familiar with the software and incorporating it into the classroom to convince teachers of the effectiveness of interactive books in the educational process and they recognize that in addition to printed books it can be beneficial to use interactive books in the classroom in the future, (D) after implementation, teachers will consider interactive books as digitally transmitted literature rather than gamification.

Results

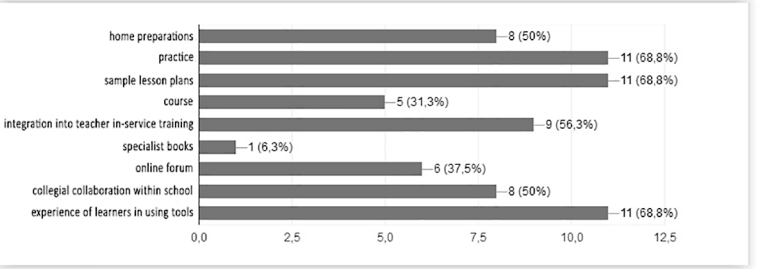
(A) Sample lesson plans are helpful

The sample lesson plans help to implement all three interactive books used in the pilot, taking into account the goals and tasks of Hungarian language and literature education as set out in the *National Curriculum* and the *Framework Curriculum*. The *Who ate the raspberry?* sample lesson plan synchronously prepared and helped to carry out the tasks and classroom work of the students who were processing the poem in interactive book form and in printed text form.

In the introduction to the lesson plans, the development focus is described in detail. In the tuning, meaning-making and reflection sections of the lesson, on the one hand we have formulated suggestions for the content of the lesson, and on the other hand we highlighted in colour practical tasks related to the use of the tool. The feedback from the teachers involved in the impact assessment surveys on the sample lesson plans as teaching aids was clear: the lesson plans helped to organise the teaching-learning process and to conduct the lesson. 93.80% of the teachers who used sample lesson plans had no problems in using the interactive book in the institutional teaching process. In response to the question "What would be most helpful in integrating the use of the interactive book into the lesson?", 68.80% of the teachers-subjects answered that the sample lesson plans were the most helpful for them (16.7.). It can be concluded that the 16 teachers who participated in the preparation of the impact study

during the pilot, integrated the interactive book seamlessly into the Hungarian language and literature lessons' process they were teaching.

Fig. 24: Views of teachers involved in the impact assessment on the professional ways to integrate interactive books into the classroom (Number of respondents: 16 persons).



(B) Teachers' professional-methodological knowledge of interactive books needs to be expended

The attitudes of the teachers participating in some of the pilot research tasks and in the measurement processes of the impact study were both positive. By their own admission, they were happy, curious and motivated to take on the educational tasks related to the implementation of the interactive book and had no problems with the use of the interactive book in the classroom (Annex 9, question 6). Similar statements were made about lesson planning: 75% of the teachers who participated in the impact study and 53.30% of those who partially participated in the pilot measurements said that they had no problems with writing lesson plans based on the use of the interactive book. The exact figures are shown in fig. 25,26,27,28.

Fig. 25: To what extent did teachers involved in the impact assessment have difficulties in implementing interactive books in the classroom? (1=no, 5=great) (Number of respondents: 16 persons)

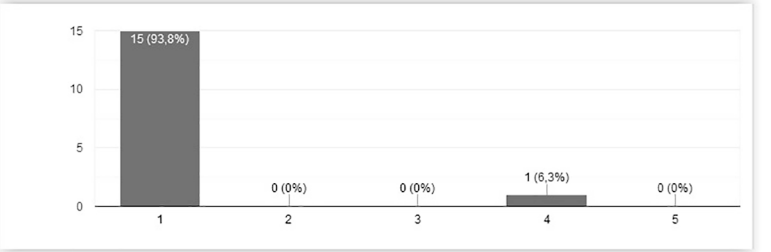


Fig. 26: To what extent would teachers involved in the impact assessment have difficulties in creating lesson plans based on the use of interactive books? (1=no, 5=great) (Number of respondents: 16 persons).

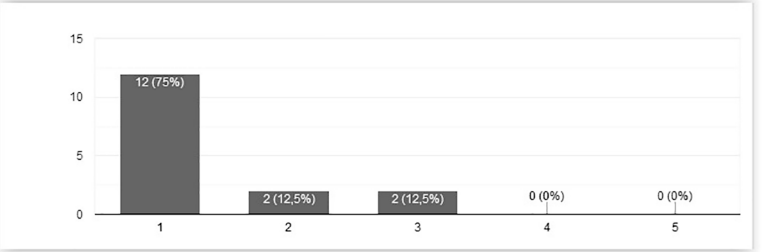


Fig. 27: To what extent did teachers (not involved in the impact assessment) have difficulties in implementing interactive books in the classroom? (1=no, 5=great) (Number of respondents: 15 persons).

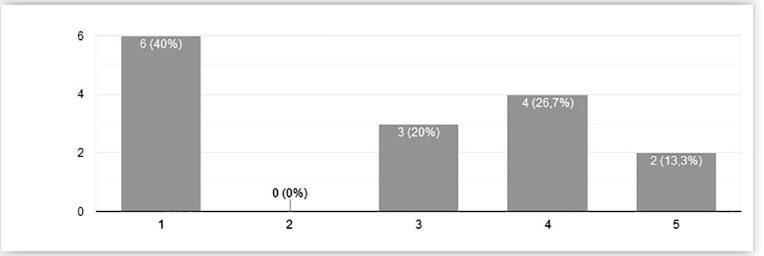
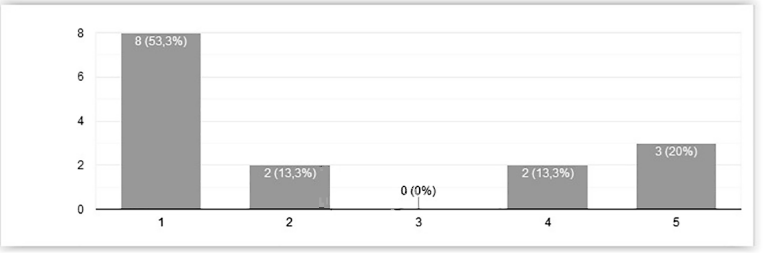


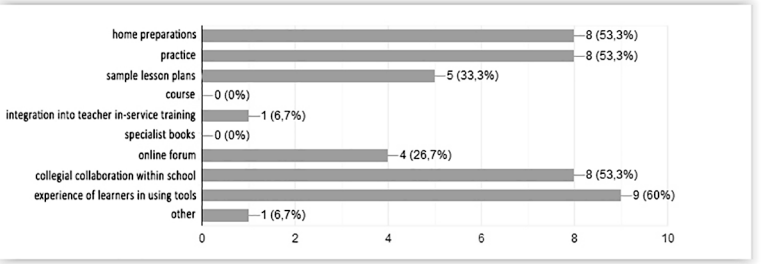
Fig. 28: To what extent would teachers (not involved in the impact assessment) have difficulties in creating lesson plans based on the use of interactive books? (1=no, 5=great) (Number of respondents: 15 persons).



The responses to the question "What can best facilitate the professional integration of interactive books into the classroom?" were heterogeneous in both groups, and, in relation to the two groups, they also differed in terms of content (fig. 24, fig. 29). It can be observed that teachers participating in the impact assessment who implemented the BOOKR Suli software for a longer period of time, continuously and following the recommendations of the research's professional leaders (see participation in webinars, professional briefings and trainings, methodological letters, the use of sample lesson plans and specialist books), responded with increased professionalism and demonstrated greater responsibility and higher levels of commitment than those (see the 42 person mentioned above) who were involved in the survey process only on one occasion. In fact, the former group would place more

emphasis on teacher training and in-service training within the institutional framework in the future, and also considers the role of sample lesson plans in the implementation of interactive books to be more important than the latter group.

Fig. 29: Views of teachers involved in the impact assessment on the professional ways to integrate interactive books into the classroom (Number of respondents: 15 persons)



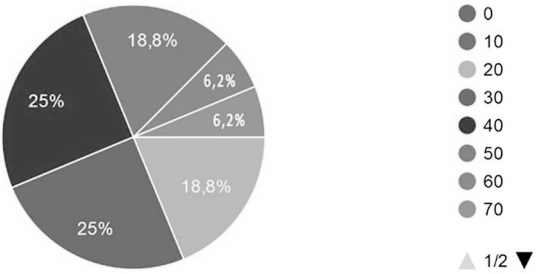
We believe that developing reading and reading comprehension skills through the use of interactive books requires expanding teachers' current professional and methodological knowledge related to teaching digital literature. At present, lower grade teachers and teachers at primary school level are not adequately prepared to design lessons with interactive books in a similar quality as with printed books. In an interactive classroom, students have to become users from readers, their changing status and function requires acquiring a new kind of communication competence and teachers are expected to enable them to acquire it. During the pilot study, teachers experienced and became aware of the fact that students using interactive books acquire knowledge differently from text analysis through printed books. Thus, in accordance with the new knowledge structures, teachers also need to learn new techniques and create new routines.

(C) Teachers are expected to be convinced of the advantages and benefits of interactive books

Getting familiar with the software and using it in their lesson convinced teachers of the effectiveness of interactive books in the classroom. The subjects of the survey acknowledged that based on their present experience, they would

incorporate interactive books into their lessons besides using printed books in the future. Based on the responses of teachers participating in the impact assessment, expressed as a percentage, the latter statement meant the following: 18.80% of teachers stated that it would be advisable to present the curriculum through interactive books in 20% of lessons, 25% would do the same in 30% of the lessons, 25% would implement them in 40% of lessons and 18.80% of teachers would use them in 50% of their lessons. 6.30% of the subjects would use the applications in 60% or even 70% of their lessons (fig. 30).

Fig. 30: Views of teachers participating in the impact assessment on in what percentages of Hungarian language and literature lessons it would be useful to present the curriculum through interactive books (Number of respondents: 16 persons)



When assessing the experience behind the high numerical values, the most crucial questions were: What types of text do you think interactive books would be suitable for analysing? In your experience, in which type of lesson can interactive books be best used? In your opinion, which stages of the lesson can the BOOKR Suli app used in? In our subjects' views, the BOOKR Suli applications provide a good basis for lessons presenting new content and revision lessons (the percentage of relevant answers: 100%), and they have clear benefits (according to 93% of respondents) especially in the meaning-making stage of lessons, (however, according to 56.30% of respondents, they are also a beneficial tool in the tuning-in stage and the reflection stage of lessons). Furthermore, they facilitate teaching the types of text that provide opportunities for experiential learning (according to 100% of respondents). According to 81.30% of the subjects, they are also effective in lessons that provide opportunities for

students to develop skills and knowledge, 87.50% of respondents emphasized their importance in lessons teaching a historical topic, and 81.30% thought that they are suitable for teaching informational texts in the classroom.

Teachers have found that BOOKR Suli is a powerful motivating force in the classroom regardless of students' gender, academic success, previous performance in reading, and their parents' level of education and literacy skills and social environment. All this may have also contributed to the fact that teachers recognised the benefits of implementing interactive books in the classroom. In our subjects' views, (12.50% and 18.50% and 18.50%), it is true that children with poor academic achievement, poor reading skills and brought up by parents with lower literacy levels are far more engaged and motivated by the multimedia mode of knowledge transmission than their peers with good academic achievement, good reading skills and growing up in a literary-rich environment. It should be noted that the teachers involved in the preparation of the impact assessment during the pilot study indicated not only in their responses to the questionnaires, but also in their subjective reports and letters to the developers that the experience they gained convinced them of the benefits of the tool.

(D) Teachers consider interactive books as digitally transmitted literature rather than gamification

In addition to interactions that are essential for playing the story, the majority of applications available on the interactive book market also include games for children to learn new skills and have fun at home. While the latter, at least quality applications, promote children's development in many ways, they are not explicitly designed for educational purposes. Developed for institutional use, the BOOKR Suli applications are task-centred in terms of their interactions intended to unfold and understand the story (see word explanations, sound effects that reinforce the meaning of text and images) and the "appendices" at the end of the applications, which are structurally highlighted and separated. This means that the BOOKR Suli's interactive books contain "tasks to be completed," "responsibility for completing the assigned tasks," that require students' attention and knowledge to complete the assigned tasks. The software thus provides alternative media for workbooks and worksheets.

"Gamification" reminiscent of different types of digital games, including interactive books with "fun" modalities (e.g., blowing, shaking, lifting overhead) is limited to just some elements of effective and visual feedback of the

BOOKR Suli app, only to the details whose primary purpose is to keep students motivated and maintain their attention.[46] For example, in the event of a task failure, students can hear characteristic feedback or the blank bounces the incorrectly matched pair in an exciting way in terms of visuality.

It can be stated that teachers involved in the pilot study (14 persons) considered the "appendices" to be less playful than the interactions embedded in the story, and teachers who participated in the impact assessment and thus prepared their lessons using interactive books in accordance with the expectations of the pilot study generally considered the BOOKR Suli software to be an application designed for educational purposes rather than a gamification application.

Summary and Evaluation of the Results

The table below summarises the criteria (left column) and results (right columns: yes/ partly/ no options) of the teacher reflections on the feasibility of implementing interactive books in the classroom, as explained in more detail above (table 6).

Table 6: The table summarises the results of the measures of teacher reflections

HYPOTHESIS **BOOKR Suli apps can be implemented in pilot lessons**	**yes**	**partially**	**no**
(A) sample lesson plans offer support to teachers	+		
(B) teachers' current professional and methodological knowledge is to be expanded		+	
(C) teachers will be convinced of the effectiveness of interactive books	+		
(D) teachers consider them as digital literature rather than gamification		+	

The relative value of positive results is further enhanced by the fact that at the start of the empirical research process, a significant percentage of teachers participating in the study (26.90%) had "mixed feeling" about the task of implementing BOOKR Suli software. After their trying out the software, this number decreased significantly (6.67% of subjects voted for the mean value indicated by point 3 on a five-point scale). With very few exceptions (6.67%), everyone was motivated to try out the application in their classes. Overall, 70.05% of the respondents, by their own admission, had no difficulties incorporating interactive books into the classroom. In the case of the 16 teachers who used the sample lesson plan in their lessons, this proportion was even higher, 93.80%.

Regarding the media and cultural characteristics of interactive book reading, the survey participants had an outstandingly positive opinion. On the one hand, in their view, interactive books provide an opportunity for teachers to take into account the differences in students' abilities in class. 74.58% of teachers who generally considered differentiation to be important (86.25%, indicated by 4–5 on a five-point scale) stated that this goal could be achieved through the use of the software. On the other hand, in their view, the new form of transmission of literary works is also suitable for reducing socioeconomic and sociocultural disadvantages (while Hungarian language and literature classes delivered in the "traditional" way were rated as moderate by 66.70% of teachers in this respect, 26.68% rated lessons using interactive books as "good" by and 26.67% as "excellent"). Thirdly, the data show that teachers can imagine the utilization of the visual material (still images) in interactive books covering a broader spectrum in the future than they can in the case of printed books (in particular, 79.99% of teachers rated the beneficial effects of pictures on students' creativity as good).

Our research has shown that digital learning tools can be successfully incorporated into the development process of reading comprehension skills in the classroom. This statement is based on our experience that when using an interactive storybook, teachers do not have to "disassemble" the subject pedagogical environment of lessons for developing reading comprehension skills based on print reading. In other words, cooperative learning methods (Nagy) can be applied and the forms of work in the classroom are selected in a similar way as in lessons in which a printed text is used.

Conclusion

Our research has shown that the implementation of the hybrid medium in the classroom enrich the methodological culture of the teachers participating in the program. The practical and theoretical consequences of making them familiar with a new teaching technique in a hybrid teaching-learning environment: they can lay the foundations for and develop their students' language awareness, reading comprehension skills and narrative competence while analysing fictional texts with interactive books.

The measurement results of our research on teachers were encouraging since the response of education to changing culture is adaptive. It became clear to teachers involved in the preparation of the impact study that student immersion in the reading process and the intensity of this immersion is deeper than those who work with printed text. It was also clear that the new medium was stronger than the printed text in terms of motivating reading activity. It also became clear to them that the motivational effect of the new medium for reading is stronger than that of printed text. All this means that the conditions that are the cornerstones of literacy education have been met most in the implementation of the interactive book in the classroom.

The developmental effects of interactive books in several skill areas have been hypothesised in international reviews cited over the past few years. Taking into account different cultural-social-communication contexts, this developmental impact has been partially or fully confirmed by the critics. At the same time, however, it has been stressed that, in the absence of a historical perspective, research can only provide partial results on the role of interactive books as a new and innovative medium for the transmission of children's literature and on its role in the recipient-user process. Therefore, in addition to the theoretical study of the interactive book, further empirical research on user processes will be needed, including the exploration of the professional value preferences and reflections of the mediating teachers.

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